SPECIFICATION FOR CRANE/DRAGLINE (30 TON)

(This specification is released for procurement purposes until revised or rescinded.)

SCOPE

This specification covers a heavy duty, diesel powered crane/dragline of the full revolving, crawler-mounted type. It does not include all types and sizes of crane/draglines, but only the size identified in the title of this specification.

I. CLASSIFICATION

The crane/dragline shall be of the size specified in Table I.

II. APPLICABLE STANDARDS

The following documents of issue in effect on the date of the Invitation for Bids shall form a part of this specification to the extent specified:

SAE J987 - Boom - Method of Test
SAE J765 - Crane Load Stability Test Code
SAE J1349 - Engine Test Code
SAE J820 - Crane Hoist Line Speed and Power Test Code
SAE J881 - Sheave and Drum Sizes
SAE J1166 - Sound Measurement - Earth Moving Machinery - Operator Work Cycle
SAE J999 - Crane Boom Hoist Disengaging Device
SAE J1083 - Unauthorized Starting or Movement of Machines
SAE J930 - Storage Batteries for Off-Road Work Machines
Society of Automotive Engineers, Inc. (SAE)
400 Commonwealth Drive
Warrendale, PA 15096

Federal Occupational Safety and Health Act Standards
U.S. Department of Labor
200 Constitutional Avenue, NW
Washington, DC 20210

State Occupational Safety and Health Act Standards
N.C. Department of Labor

OSHA Division
4 West Edenton Street
Raleigh, NC 27611

PCSA-4 Standard
Power Crane and Shovel Assn. (PCSA)
111 E. Wisconsin Avenue
Milwaukee, WI 53202

ASME B30.5 - Mobile and Locomotive Cranes
The American Society of Mechanical Engineers
345 East 47th Street
New York, NY 10017

ANSI B1.1 - Unified Inch Thread Standards
ANSI B1.13M - Metric Screw Thread Standards
American National Standards Institute
11 West 42nd Street
New York, NY 10036

The definitions and requirements of PCSA Standard No. 4 (latest edition) are considered to be part of this specification. In cases where a definition or requirement contained in this specification conflict with those of PCSA Standard No. 4, then this specification takes precedence.

In cases where a requirement herein is more stringent than the corresponding requirement in a referenced specification, the requirement herein takes precedence.

TABLE I

MINIMUM REQUIREMENTS (UNLESS OTHERWISE SPECIFIED)

These requirements apply to both the lift crane and dragline configurations except where otherwise specified.

1 - Transport weight (lbs.), maximum, for lift crane configuration, with 45' of fold-away boom	70,000
2 - Lift capacity at 30' radius with 45' boom at 75% tipping load (lbs.)*, for lift crane configuration	12,000
3 - Net brake horsepower (at flywheel, per SAE J1349)	120 HP
4 - Operating Speeds	
Crawl Speed (MPH)	1.0
Swing Speed (RPM)	3.5
5 - Gradeability (%)	25
6 - Line Speeds	
Dragline Speed (FPM), for dragline configuration	140
Hoist Speed (FPM)	135

7 - Line pulls	
Dragline (lbs)	14,000
Hoist (lbs)	13,000
Third drum (lbs)	6,000
8 - Overall Crawler Length (Ft./In.)	14-7
9 - Track Pad Width - Nominal (In.)	30
10 - Boom Length (Ft.)	75

* See Lifting Capacity (Section III.A.6.)

III. REQUIREMENT

A. GENERAL

This specification covers diesel, self-propelled, full revolving crawler-mounted lift cranes and draglines. The machine shall be complete with all accessories and equipment normally furnished by the manufacturer and customarily used in crane/dragline operations, whether such accessories and equipment are stipulated herein or not.

1. Standard Product

The machine shall be essentially the standard product of the manufacturer differing therefrom only in respects necessary to meet the requirements of the crane/dragline as specified herein. Major modifications, or the use of configurations not described in the manufacturer's published literature, for the purpose of transforming an undersize machine into one which meets the specification are not acceptable, except as specifically provided for in this section. This specifically requires that the undercarriage offered (with the exception of the track shoes) must be shown in the manufacturer's published literature as being available on model of crane bid. The component parts of the crane need not be of the same manufacturer. The machine offered shall be a current production model.

In cases where the manufacturer does not offer a standard production model of the size called for herein, a non- standard configuration may be acceptable. Such non-standard configuration would consist of a standard undercarriage in combination with a standard upperstructure and power train, but the particular combination itself need not be standard. An example would be the combination of an undercarriage normally used for a 30-ton crane with the upperstructure and power train normally used on a 50-ton crane. Note that the undercarriage provided and the upperstructure/power train provided must themselves each be standard.

2. Use Conditions

Design and construction shall be such that the machine will withstand the extremely hard usage encountered in service, such as digging, hoisting, dumping of materials, pile extraction and pile driving operations, and operation in the open air under all

weather conditions for extended periods of time. Components shall be designed to resist the harmful effects of dust or water (salt and fresh).

3. Ease of Maintenance

The design of the machine shall permit ready accessibility for service, replacement, and adjustment of component parts and accessories with minimum disturbance to the other elements.

4. Frame

The frame shall be designed to withstand maximum stresses under normal operating conditions and in addition, provide adequate support for attaching any device approved by the manufacturer for use in combination with the machine.

5. Operating Weight

The machine operating weight shall include all standard equipment, 75' boom, 30" (nominal) pads, full servicing, 175 pound operator, and full fuel tank.

6. Lifting Capacity

At the operating weight as defined above, the lift capacity is to be valid for 360 degree rotation and is not to exceed 75% of tipping load. Lift capacity is the maximum allowable load per manufacturer's published lift charts for the lift crane configuration that can be lifted under the conditions specified in Table I. Minimum lift capacity shall be as specified in Table I.

Lift charts submitted with the bid are to be provided in the U.S. Customary units of pounds and feet.

7. Occupational Safety and Health Act

The machine shall be furnished with all applicable equipment and accessories as required by the Occupational Safety and Health Act (U.S. Department of Labor and the N.C. Department of Labor), including the following:

29 CFR 1926.52 - Occupational Noise Exposure

The machine shall be constructed and assembled so that the noise at ear level of the seated operator, with all doors, windows, and vents open, when measured in accordance with 29 CFR 1926.52, shall not exceed the permissible noise exposure limits of this regulation for 8-hour operator exposure.

29 CFR 1926.600 - Equipment

Safety glass for enclosed cab.

8. Screw threads

Screw threads shall be in compliance with ANSI B1.1 ("Unified Inch Thread Standards") or with ANSI B1.13M ("Metric Screw Thread Standards").

B. ENGINE

1. Diesel Engine

The engine shall be compression ignition type, 2 or 4-cycle, minimum 4 cylinders and capable of operating on commercial diesel fuel as recommended by the manufacturer. The engine shall be equipped with an adequate and efficient fuel injection mechanism, heavy duty fuel oil filter system, and heavy duty full flow type lubricating oil filter. The air cleaner shall either be two-stage (precleaner and dry type elements) or dual element type (primary and secondary dry type elements). Air cleaner hose shall be of metal or heavy duty flexible, non-collapsible type (wire reinforced hose not acceptable), and with metal or molded rubber elbows. All air cleaner connections must be banded. Exhaust pipe shall be of the deflector type. The minimum net brake horsepower at the engine flywheel shall be as shown in Table I.

2. Engine Governor

The engine governor shall be of the mechanical or hydraulic type and shall be driven from the engine, or otherwise shall be of the electronic type. Provisions shall be made for permitting regulation of the governed speed-setting throughout the engine load range while the engine is in operation.

3. Engine Starting System

The manufacturer's standard electric starting system with heavy duty battery (SAE J930) shall be acceptable for cranking the engine. The engine starting system shall be capable of cranking the engine in an ambient temperature of-20°F. The battery shall be specifically designed to withstand the shock, vibration, and dusty environment normally encountered by off-road work machines. A shock resistant battery mount is not an acceptable substitute for the type of battery required, though such mount may be furnished in addition to the proper battery. A means shall be provided to lock the starting controls and a concealed electrical disconnect shall be provided (SAE J1082).

4. Engine Cooling System

The unit shall have heavy duty radiator and blade type fan. The cooling system shall be protected with permanent type antifreeze to a minimum of -20°F and so tagged.

5. Engine Lubricating System

The manufacturer's current standard production lubricating system shall be acceptable, provided all anti-friction bearings are protected by suitable seals to prevent the entrance of abrasive matter. Lubrication fittings shall be grouped and located for maximum accessibility.

C. FUEL TANK

The machine shall have a large enough fuel tank to allow continuous operation for eight hours. The fuel tank shall be located so as not to be affected by heat from the engine or exhaust system. The machine must be capable of being fueled by a service truck with a regular fueling nozzle. It is not to be equipped with a hand operated or other type fuel transfer pump.

D. POWER TRAIN AND POWER TAKE-OFF

1. Gears

All main machinery gears in the power train shall be enclosed in dirt-tight cases, and if not, shall be adequately lubricated for extended life. A convenient means for lubricating these parts shall be provided.

2. Power Take-off

Power take-off from the engine may be mechanical drive, hydrodynamic drive (fluid coupling or torque converter), or hydrostatic drive. The power take-off shall include a friction disconnect clutch, controlled from the operator's station. In revolving superstructure machinery drives, the disconnect clutch shall be provided with a device requiring positive manual effort to engage. Where a transmission having neutral position is used in combination with an engine clutch, the clutch may be of the spring loaded type.

E. CRAWLER BASE

The minimum overall crawler length shall be as specified in Table I. Drive tumblers and idlers shall be of the self-cleaning type and have means for adjustment. Hydraulically extended and retracted side frames are to be provided. Crawler pads shall be flat with smooth tapered surfaces to deflect dirt, prevent gouging on short turns, and minimize damage to road surfaces. The pads shall be 30" wide (nominal). Operating speeds shall be as specified in Table I. Machine without load shall be capable of climbing a 25% grade on smooth, dry surface.

F. BOOM

1. Boom

The boom shall be the angle type and the boom length shall be as specified in Table I, measured from center to center of end pins. Tubular steel type booms are not acceptable. Overall boom width shall not exceed 48". Boom shall be amply designed and matched for service with the specified bucket size. The boom shall have a pendant type suspension, and provisions shall be incorporated for readily increasing the boom length by inserting additional sections.

Each boom section is to have a permanently stamped or affixed identifying serial number. In addition the entire boom system, consisting of the individual serial numbered boom sections furnished, is to be certified by the manufacturer for the lift capacities claimed in the bid, when boom is used in conjunction with the particular crane unit furnished. This certification, in proper form, is to be provided to the user at the time of delivery of the crane.

2. Boom Tip

The boom tip shall be provided with four sheaves of equal size mounted on bushings. Full rope guards shall be provided for sheaves and boom tip.

3. Boom Controls

The unit shall have an independent positive boom control at all times and for all operations, which specifically includes the ability for simultaneous swing and travel. The unit shall have independent power up and power down boom hoist which shall be operable while the machine is hoisting, swinging, or crawling. ("Power down" as

applied here to boom hoist means that the engaged power train governs the speed of lowering of the boom, while gravity is the force that actually lowers the boom.) The hoisting apparatus shall be equipped with boom hoist throw-out (to restrict hoisting boom beyond recommended minimum radius) and automatic safety brake.

The boom hoist shall be capable of suspending the boom and rated load with recommended reeving, without attention from the operator, and shall allow lowering only when under operator's control.

4. Boom Stop

The machine shall have an energy-absorbing boom stop mechanism to effectively prevent the boom from overtopping in the event of failure of load-line or hoisting tackle.

G. MAIN, AUXILIARY, AND THIRD DRUMS

1. Main and auxiliary drums

Due to safety considerations, both the main drum and auxiliary (second) drum shall have power load lowering (control of the speed of load lowering by engagement of the power train during the lowering operation, as opposed to control by mechanical braking alone). It is not required that both drums simultaneously utilize power load lowering. Clutches and brakes for the main and auxiliary drums shall be in full compliance with ASME B30.5.

2. Third drum

The machine shall be equipped with an independently operated third drum (third drum shall be capable of operation simultaneously with operation of the main and auxiliary drums, and shall have its own dedicated operator control lever). It is not necessary, however, that the third drum have the capability to operate simultaneously with power load lowering on the main and auxiliary drums. The third drum assembly may be hydraulically or mechanically powered, shall be installed by the crane manufacturer and left ready for use when the machine is delivered, and shall be in full compliance with ASME B30.5. It is acceptable that the third drum assembly/installation be custom designed and built if such is necessary to provide the third drum and the required power load lowering on the main and auxiliary drums.

H. CAB AND MACHINERY HOUSING

The operator's cab and machinery housing shall be a fully enclosed steel structure. Doors shall be provided on the sides and rear for convenient entrance to the machinery.

The operator's cab shall have safety glass panels for full vision of the crane working area. For purposes of providing adequate cross-ventilation, at least two of the cab windows shall be hinged or otherwise mounted such that they are easily opened by the operator and will remain in the opened position until intentionally closed. In addition, for increased operator comfort, two cab fans, adjustable in angle, minimum 6" disk diameter, shall be furnished and installed. The door to the operator's cab shall have a key locking door handle and door hold-back. The operator's seat shall be located within easy and convenient reach of the crane operating hand controls and foot pedals.

A catwalk and an overhead grab rail shall be furnished on each side of the cab and machinery housing.

Cab air-conditioning, factory-installed, is required. The air-conditioning system as provided must be of a capacity sufficient to adequately cool the interior of the cab during the expected conditions of heat and humidity within the state of North Carolina throughout the summer season.

I. ATTACHMENTS

Unless otherwise specified in the IFB, each machine shall be furnished with the following:

1. Fairlead

   The crane/dragline shall be equipped with a full revolving fairlead with anti-friction bearings on revolving frame. Wear plates or rollers shall be furnished at cable entrance.

2. Tagline

   A coil type tagline shall be furnished complete with recommended cable and accessories, Rud-O-Matic 648, or equivalent.

3. Bucket

   The bucket shall be a 1½ cu.yd., dragline general purpose, perforated type, and have a minimum of four replaceable teeth. Chains, pins, lips, wearing plates, and runners shall be 14% manganese steel. (Hendrix "TS", or equivalent).

4. Crane Lifting Devices

   The unit shall be furnished with manufacturer's standard lifting devices including at least a main lift hook block, 50-ton rating, for each lift crane and each dragline offered. Main lift hook block to be furnished installed on each lift crane, and to be furnished uninstalled with each dragline. In addition, an 8-1/2 ton hookball with swivel is to be furnished uninstalled with each lift crane and each dragline.

J. EQUIPMENT AND ACCESSORIES

Each machine shall be furnished with the following equipment and accessories:

1. Muffler.
2. Air cleaner restriction indicator of the proper size and setting, Bacharach or equal.
3. Radiator guard.
4. Boom angle indicator.
5. Cold weather starting aid (pressure canister, cable controlled from operator's station).
6. Vandalism protection kit. The kit shall include locking type doors and lock type caps for exposed filler caps and oil dipstick pipe (less padlocks).
7. Swing lock and swing brake. Swing lock shall be of a positive type with control by operator.
8. Overload warning device, audible-type, Wylie Model Number WW250/Total Moment Style Indicator with Data Logger, or approved equal. Dynamometer used on load line is unacceptable.
9. Drum rotation indicator for each drum, installed.

10. In-line fuel heater installed upstream of filter. Hot-water type fuel heaters are not acceptable.
11. Draglines are to be rigged as called for in the Invitation For Bids but are to be furnished with all equipment and accessories required to also operate as a lift crane, and such lift crane is to be in full compliance with this specification. This also includes the full lift crane counterweight.
12. Fire extinguisher, 10-pound (10BC) dry type mounted within the cab at a location clearly visible to, and quickly accessible by, the operator.
13. Equipment motion alarm.
14. Anti-two-block warning device.
15. Undercarriage level indicator in cab.

K. STEERING AND BRAKING

The machine shall be capable of being steered either right or left in either direction of travel. Control shall be from the operator's position on revolving superstructure.

Traction jaw clutches and/or spring loaded traction brakes must be designed to prevent "runaways" in rough terrain.

L. TOOLS AND LUBRICATING EQUIPMENT

A tool box with lock shall be provided on the machine and shall contain all special tools necessary for servicing the machine. A suitable hand operated lever type grease gun shall be provided.

All grease fittings for joints which require periodic lubrication are to be grouped in a common panel remote from the various joints, and so located that the operator can access all the fittings while working upright using normal reach. Fittings with the same lubrication schedule are to be placed in a common dedicated bank within the panel, and each bank is to be identified with respect to its intended lubrication schedule. Each individual fitting is to be properly and permanently labeled. It is permissible for all joints in the undercarriage to be serviced by a single such grease fitting if necessary. Components which are not part of the basic machine as defined in PCSA Standard No. 4 do not need to be provided a fitting in the remote common location.

M. PAINTING

All exposed metal parts of the machine shall be cleaned of all mill scale, rust, grease, etc., then primed and undercoated with a rust resistant paint in accordance with acceptable shop practice. The finish coat shall be "NCDOT Safety Yellow", which shall be visually inspected for suitable match in the following manner: Prior to the finish painting of equipment, the successful bidder will be provided a paint chip by the North Carolina Department of Transportation which has been prepared utilizing a minimum of one (1) mil thickness of grey primer and a minimum of two (2) mil thickness of DuPont #93-54701A lead free. The successful bidder shall be required to return the DOT paint chip and furnish two (2) 3-1/2" x 8" painted panels representing the finished color for approval. If approved, one panel will be returned to contractor and other will be retained by the State for color comparison; color of equipment them must match color of approved panel.

NCDOT Safety Yellow finish coat shall be DuPont #93-54701A lead free, Moline MPM 11Y169-A lead free, or an acceptable equivalent.

The entire car body and counterweight shall be painted NCDOT Safety Highway Yellow. The undercarriage and boom shall be painted automotive flat black. Interior of the cab shall be a non-glare color.

N. OPERATOR'S SEAT AND CONTROLS

The operator's seat shall be located within easy and convenient reach of all controls. It shall provide for comfortable riding position and for good visibility of the work zone and bucket position. The machine shall be either manually controlled, manually controlled with mechanical boosters, hydraulic or air over hydraulic, or air or hydraulic controls over mechanical.

O. INSTRUMENTS AND GAUGES

The instrument panel shall be located in view of the seated operator. The manufacturer's standard instrumentation shall be furnished unless otherwise specified in the IFB.

IV. WARRANTY

The contractor warrants to the owner that all equipment furnished under this specification will be new and of good material and workmanship, and agrees to replace promptly any part or parts which by reason of defective material or workmanship shall fail under normal use, free of negligence or accident, for a minimum period of 12 months from date put in operation. Such replacement shall include all parts, labor, and rountrip transportation costs to the location where equipment is down, free of any charge to the owner or his representative.

Under same and all conditions as above, the power train (engine, transmission, torque converter, and final drive) shall be covered for an additional period of at least 24 months. Any periodic inspections which may be performed by the contractor or his representative shall be without charge to the owner.

V. SERVICE, PARTS, AND OPERATOR'S MANUALS

The contractor shall furnish a qualified representative to instruct the owner's operator(s) in the operation and maintenance of the equipment for a minimum period of eight hours per location at each location specified in the IFB.

Complete operator's manuals, shop manuals, and parts books shall be furnished and shall completely cover the exact model delivered. The number of sets of these documents shall be equal to the number of units purchased plus two additional, unless otherwise called for in the Invitation For Bids. A suitable container shall be attached to an appropriate and convenient area of an interior cab wall of each unit for storage of one complete set of the above documents.

For each specific machine delivered (by serial number), a complete listing of the make and model of each assembly or unit (like a pump) or accessory on the machine is to be provided. This list will be used in conjunction with the parts book to obtain the proper replacement components as the need arises.

A load chart for the exact unit delivered shall be provided with the unit and shall be affixed to an interior cab wall in a location easily visible by the seated operator. The load chart shall be fabricated so that it will not deteriorate from continuous exposure to harsh conditions.

A complete set of full-size glass patterns shall be provided to NCDOT at time of delivery of the units. Patterns shall include dimensions necessary to fabricate and replace all window glass in the units purchased. The patterns will become the property of NCDOT, and as such the right to reproduce and distribute those patterns for NCDOT use only will be permitted.

VI. ACCEPTANCE EVALUATION AND QUALITY ASSURANCE

Upon receipt of each crane/dragline at the receiving point, the purchaser or his authorized representative shall arrange for an acceptance inspection for compliance with the provisions of this specification and the rest of the contract.

The contractor shall furnish a pilot model for inspection, test, and possible modification and/or adjustment of attachments in accordance with this specification unless otherwise specified in the IFB. It is acceptable to hold the pilot model inspection at the manufacturer's plant located in the United States, unless otherwise stated in the Invitation For Bids. The user reserves the right to test all functions of the crane and dragline at the inspection.

VII. DELIVERY AND PAYMENT

Delivery of and payment for equipment purchased under this specification shall be in accordance with the terms and conditions of the Invitation For Bids. The contractor shall be responsible for any packing, packaging, or protection required to insure delivery in an undamaged condition.

The machine shall be completely serviced and ready for operation when delivered.

VIII. ORDERING DATA (For Purchaser's Use Only)

Purchasers shall exercise any desired option offered herein and specify the following:

1. Title, number, and date of this specification.
2. If special instruments and gauges are required.
3. If a bucket other than specified herein is required, specify type, etc.
4. The quantity of operator's manuals, shop manuals, and parts books to be furnished, if other than the amounts specified herein under Section V.
5. If a third drum is not required.
6. If any equipment under Section III.I. ("Attachments") is not required.
7. If on-the-job-site training by a technician in the operation and maintenance of the machine is not required. Otherwise (if training is required), specify location(s) for on-the-job-site training.
8. If a pilot model is not to be furnished.
9. If pilot model inspection is to be performed at other than the manufacturer's plant located in the United States.
10. Rigging specifics of dragline and/or lift crane at time of delivery.

**********END OF SPECIFICATION**********